STN PUB
ALASKA FOR. RES...
FOR. INSECT SURVEY
#5

Serial Library
Northern Forest Experiment Station
LIBRARY

FOREST INSECT SURVEY REPORTS

of the

ALASKA FOREST RESEARCH CENTER
U. S. DEPARTMENT OF AGRICULTURE - FOREST SERVICE

Number 5 September 1959 Juneau, Alaska

BIOLOGICAL EVALUATION OF THE BLACK-HEADED BUDWORM AND HEMLOCK SAWFLY IN THE HEMLOCK-SPRUCE STANDS OF SOUTHEAST ALASKA - SEASON OF 1959

G. L. Downing, Entomologist

INTRODUCTION

Routine sampling of insect populations by G. L. Downing of the Alaska Forest Research Center in mid-July and early August revealed the presence of large numbers of the black-headed budworm (Acleris variana (Fern.)) and the hemlock sawfly (Neodiprion tsugae Midd.) in the hemlock-spruce stands of southern Southeast Alaska. The heaviest populations were encountered in the Chomly Sound area but population increases were also noted in Kasaan Bay and Portland Canal. Although these were the only areas visited it is considered likely that most of the stands in this general area harbor increased populations of these two insects. In addition, a local buildup of these pests in the immediate vicinity of Ketchikan, reported last year,[1] persisted in 1959.

SIGNIFICANCE OF POPULATION INCREASE

The significance of this increase in insect numbers is apparent when it is recalled that the last outbreak, from 1948 to 1955, began in the southern end of the panhandle.[2] During that outbreak the population increase progressed northward throughout most of Southeast Alaska usually persisting in heavy numbers for one or two years in a given locality before subsiding. Resulting damage to the infested stands was estimated at 268 million board feet (net loss) for hemlock[3] and only slight damage to spruce stands.

1/ Alaska Forest Research Center. Summary of forest insect conditions in Alaska. Juneau, Alaska. 1958.

2/ McCambridge, W. F. The black-headed budworm survey on the Tongass National Forest, Alaska, Season of 1955. Alaska Forest Research Center, Juneau, Alaska. 1955.

3/ Taylor, R. F. Biennial Report for 1956-1957. Alaska Forest Research Center, Juneau, Alaska. 1958.

Further evidence of a general population increase is a report[4] by Canadian forest biologists of a large black-headed budworm population in the Queen Charlotte Islands this year.

INSECT AND HOST

Briefly the biology of each insect is:

Black-headed budworm[5]--This insect has a one-year life cycle. The eggs are laid on needles during August and September and the winter is spent in this stage. During late May and early June the larvae hatch and begin feeding on the expanding buds. The growing larvae feed primarily on the new foliage. This feeding period lasts 1½ to 2 months at the end of which time the larvae transform into pupae. The pupal stage lasts from 10 days to about 2 weeks. Moths begin emerging in late July becoming most numerous in August and September.

Hemlock sawfly[6]--This insect usually completes one generation per year; however, some individuals hold over in the cocoon stage for two or more years before completing a life cycle. Eggs are laid in the late summer or early fall in slits cut by the female sawfly in needles of the current year's growth. Overwintering takes place in this stage, and hatching occurs by late spring or early summer. The larvae feed on old-growth needles until shortly before forming cocoons. This takes place from late July to mid-September. Adult sawflies usually emerge during August and September.

It can be seen that these two insects have life cycles that are similar. Probably the most important difference is in feeding preference. The budworm prefers new-growth and the sawfly old-growth. Where the two occur together in outbreak numbers complete defoliation of a stand may occur. Individually the black-headed budworm is considered to be the most damaging of the two species.

The host trees involved are western hemlock (Tsuga heterophylla (Raf.) Sarg.) and Sitka spruce (Picea sitchensis (Bong.) Carr.), with hemlock the primary host.

4/ Personal communication from G. T. Silver, Forest Biology Laboratory, Victoria, B. C.

5/ McCambridge, W. F. Progress report - Studies of the biology and control of the black-headed budworm in Alaska, Season of 1954. Alaska Forest Research Center, Juneau, Alaska. 1955.

6/ Downing, G. L. Hemlock Sawfly. Forest Pest Leaflet 31. U. S. Department of Agriculture, Forest Service. 1959.

INFESTATION TREND

Larval collections from the infestation area have been reared in Juneau and insect parasitism determined. Parasitism of the black-headed budworm is about 20 percent and that of the hemlock sawfly almost nil. If this holds true for the entire area a large population increase can be expected next year unless natural control factors exert a strong influence during the overwintering period.

The population is reaching a dangerous level and moderate to heavy defoliation may appear in the vicinity of Chomly Sound, and perhaps other areas, next year. Records from the last outbreak indicate that heavy to severe defoliation of a hemlock stand for one or more years may result in top-killing and complete tree killing.7/ This then means that some permanent damage is likely to result by 1960 or 1961 should the outbreak continue to increase in severity.

CONCLUSION

Should the infestation continue, and control be deemed desirable, there is every reason to believe that both the black-headed budworm and the hemlock sawfly can be controlled. One aerial application of DDT spray applied at the rate of 1 pound of DDT per gallon of fuel oil per acre should be effective. This is the same formula used on most large-scale aerial spraying operations to date. Spraying should be directed against half-grown larvae. For both insects this would be late June or early July.

The effect of aerial spraying on salmon spawning streams in Southeast Alaska has come under serious discussion within the last year. The possibility of a cooperative project involving the Fish and Wildlife Service, Region 10 of the Forest Service and the Research Center is in the initial planning stages. Certainly, such a study would be desirable prior to any large-scale spraying operation.

7/ Downing, G. L. Western hemlock damage caused by the black-headed budworm, appraisal survey, Thayer Lake, Admiralty Island, Alaska. Alaska Forest Research Center, Juneau, Alaska. 1957.